

Playing with the momentum principle: the Newton program

- Go the course web site, choose Resources, then Demo programs.
- Left click the link on “Playing with the momentum principle”.
- Copy and paste the program into the VPython editor (IDLE).

This program illustrates the momentum principle.

In the right window, hold down the left mouse button and drag a force vector.

The ball in the left window moves under the influence of this *single* force.

(The ball could be in outer space, with only a single force applied to it, or there could be several forces, including frictional forces, and the force vector represents the *net* force being applied.)

The green arrow is the net force; the red arrow is the momentum of the ball.

This program lets you observe the “indirectness” of the momentum principle.

The momentum isn’t related directly to the force.

Rather, it is the *change* of momentum that is related to the force.

To see this, try the following:

- Make the ball move due to a constant (vector) force. What happens to the momentum?
- Make the ball move with a constant (vector) momentum. What force is required?
- What do you have to do to make the ball stop, then go in the opposite direction?

- Make an example where there is a big momentum but zero force.
- Make an example where the momentum is (momentarily) zero, but there is a big force.
- Make an example where the momentum is in the opposite direction to the force.

- Make the ball move in a circle. What do you have to do? Is the magnitude of the momentum changing? Is the direction of the momentum changing?

Everyone in the group should try these things themselves, to get a feel for how the momentum principle plays out in practice. Your instructor will ask you about some of these examples.

CHECKPOINT N1: Ask an instructor to check your work for credit.
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More playing around

Try writing your name!